



Shaw Environmental, Inc.

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November 18, 2011

**Subject: LNAPL Containment Well Location and Installation  
LNAPL Containment Interim Measures Work Plan Part I - Characterization, Bulk  
Fuels Facility Spill, Solid Waste Management Units ST-106 and SS-111  
Addendum November 2011  
Albuquerque, New Mexico**

This letter is being submitted as an addendum to the Light Non-Aqueous Phase Liquid (LNAPL) Containment Interim Measures Work Plan, prepared by Shaw Environmental and Infrastructure, Inc. (Shaw) for the U.S. Army Corps of Engineers (USACE) under contract W912DY-10-D-0014, Delivery Order 0002. This letter describes Shaw's proposal to install a single containment well at a location approximately 180 feet east of the location proposed in Figure 4-1 of the work plan. Additionally, this letter describes revisions to the well design, and installation discussed in Section 6.0 of the work plan.

Shaw conducted a technical evaluation of the proposed containment well location and quantity as a result of discussing with the NMED Tiger Team on 3 November 2011. As a result of that evaluation, Shaw determined that a single containment well would be sufficient for containing the LNAPL, meeting the primary objective of the containment system and work plan. The proposed change is to move KAFB-106157 approximately 180 feet southeast of the original location (Figures 1 and 2). Figure 3 shows the predicted capture zone of this containment well, using the most recent hydrogeological data and recently acquired production well data for both Kirtland Air Force Base (AFB) wells and the Albuquerque Bernalillo County Water Utility Authority (ABCWUA) wells.

Soil cuttings will be collected and logged every 5 vertical feet from ground surface to the total depth of the well. The data that will be recorded will be as follows:

- Soil will be classified every five feet in accordance with the Unified Soil Classification System (USCS). These classifications will be applied in the field by the geologists and will be subject to revision based on laboratory tests and subsequent review by the Project Geologist.
- A full description of soil samples will be made, and will include but not be limited to, the USCS two-letter classification, consistency, soil moisture, grain size, and size distribution.
- Depth limits, and the type and number of each sample taken will be indicated. All samples will be numbered consecutively.
- Depth to water as first encountered during drilling, along with the method of determination, will be noted. Any distinct water-bearing zones below the first zone also will be noted. Other observations during drilling will be noted, such as bit chatter, rod binding, rod drops, flowing or heaving sands, bit pressure, rod rotations per minute, and water pressure.
- If drilling fluid is used, the fluid losses, the interval over which they occur, and the quantity losses, will be recorded.

- A general description of the drilling equipment used will be provided. This description, including such information as rod size, bit type, pump type, rig manufacturer, and model, may be provided in a general legend.
- Dates and times of start and completion of boring will be indicated.
- The names of the contractor, driller, and rig geologist will be noted.
- The size and length of casing or auger used in each borehole will be noted.
- Observations of visible contamination for each sample or from cuttings that appear contaminated will be made.

Field instrument readings will be noted.

In order to accommodate the documented rise in water levels in the project area, the screening interval of the LNAPL containment well has been revised from what was proposed in the work plan. Figure 4 is a schematic diagram of the proposed well construction. Below is the proposed procedure and well design for the LNAPL containment well KAFB-106157:

- The well location will be tested for utility clearance to five feet with a hand auger or a post hole digger.
- The well boring for the LNAPL containment well will be advanced using ARCH drilling method to approximately 60 feet below the water table. The well will be installed approximately 540 feet below grade at the well location.
- KAFB-106157 will be constructed with 90 feet of 8-inch diameter welded joint 0.030 slot stainless steel continuous wrap screen with double strong wires and rods, a 10-foot blank stainless steel pump sleeve section placed approximately 30 feet below the current water table, and a Schedule 40 carbon steel casing riser (Figure 2). The well will be constructed with 60 feet of screen/pump sleeve below the water table and 40 feet of screen above the water table to accommodate future water table rises. The steel well casing will extend approximately 2.5 feet above grade as a temporary completion during well development. The final depth of the pump sleeve will be decided in the field based on lithology encountered during drilling.
- Prior to start of well drilling the contractor will provide manufacturer's written documentation that the screen sections meet the design requirements, the carbon steel casing shall be marked as per design requirements, and the Contractor will confirm that the casing welder is experienced in welding of stainless steel casing.
- An engineered 10-20 sand pack filter pack will be installed in the annular space between the well casing/screen and the borehole from the bottom of the borehole to approximately 10 foot above the top of the screened interval. The filter pack will be slurried with clean potable water and tremied into place to prevent bridging and to ensure continuous placement, while the drive casing is slowly removed. A 10-foot hydrated bentonite seal will be emplaced above the sand filter pack and incrementally hydrated with potable water in 1-foot lifts.
- After the last lift has hydrated for 2-hours, a cement grout with 6 percent bentonite and 2 percent calcium chloride by weight mixed at a weight density not less than 12.5 pounds per gallon will be

emplaced by tremie pipe to approximately 1.5 foot below the ground surface. The contractor will provide a mud balance and measure the grout weight density twice during placement to certify the grout specification.

- The well will be developed no sooner than 48 hours after the grout has cured and no later than 7 days. Initial development will consist of a combination of swabbing, jetting, bailing, and/or pumping until little or no sediment enters the well across the entire screened interval below the water table. The contractor will not be required to develop the screen interval above the water table.

The drive casing will be pulled from the borehole periodically during construction. Well construction diagrams will be completed for each installed well.

Section 5.1.3 describes a series of pumping tests that would be performed on the containment well(s). Shaw proposes replacing the proposed pumping tests with an enhanced well development at KAFB-106157 in order to collect the data required to complete the design of the full containment system. This will involve the installation and monitoring of a pressure transducer in KAFB-106157 during well development to measure drawdown and recovery. A full pumping test would be conducted once the full containment system including treatment system is installed and ready for operation. The well development will produce approximately 40,000 gallons of wastewater that can be containerized for disposal, thereby reducing the volume of water requiring handling as part of the discharge process.